Daily rainfall at Weather Bureau stations between the Mississippi River and the Rocky Mountains, May 16–31, 1903.

Stations.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	Total.
Williston, N. Dak	0.16	0.08	0.34	T.	T.	0.94	1.49	0.12	0.02	.....	0.08	.....	0.60	0.04	.....	.....	3.87
Bismarck, N. Dak	.....	T.	0.86	T.	.....	0.47	1.06	.....	.....	.....	0.20	.....	.....	.....	.....	0.50	3.09
Pierre, S. Dak	.....	0.26	.....	.....	.....	0.14	0.62	.....	0.19	.....	0.04	.....	.....	0.46	T.	.....	1.71
Rapid City, S. Dak	0.02	0.14	0.30	0.16	.....	0.14	0.18	.....	T.	0.02	.....	.....	T.	0.12	.....	0.16	1.24
Huron, S. Dak	.....	.....	.....	T.	.....	0.16	0.50	0.34	0.24	0.08	0.24	0.01	.....	.....	.....	.....	1.57
Yankton, S. Dak	.....	.....	.....	0.03	T.	0.39	0.76	0.63	1.00	.....	0.39	0.39	0.43	0.40	0.10	0.03	4.55
Miles City, Mont	.....	0.10	0.22	0.02	.....	0.26	0.16	0.06	.....	.....	.....	.....	0.22	.....	.....	.....	1.04
Havre, Mont	0.02	0.96	0.44	0.64	.....	0.06	0.88	0.28	0.06	.....	.....	0.04	0.02	.....	.....	.....	3.40
Helena, Mont	0.50	0.40	0.28	0.01	.....	T.	T.	0.30	.....	0.04	.....	0.04	.....	.....	.....	.....	1.57
St. Paul, Minn	.....	T	.....	0.10	.....	.....	0.01	0.64	T.	0.62	1.04	0.24	.....	.....	.....	.....	2.65
Moorhead, Minn	.....	0.04	0.30	0.60	.....	0.24	0.42	1.50	.....	.....	.....	.....	.....	.....	.....	.....	3.10
Valentine, Nebr	.....	.....	.....	.....	.....	0.26	0.24	T.	0.10	0.04	0.50	.....	0.32	0.02	.....	.....	1.48
North Platte, Nebr	T.	.....	.....	.....	.....	0.18	0.02	.....	0.02	0.08	0.18	.....	0.01	0.43	0.06	.....	0.98
Lincoln, Nebr	.....	0.07	T.	0.24	.....	0.56	0.79	0.28	.....	1.37	1.03	0.43	0.15	1.94	1.13	0.10	8.09
Omaha, Nebr	.....	0.16	.....	0.04	0.10	0.64	0.80	0.01	.....	0.95	0.93	0.56	T.	0.52	0.40	0.10	5.21
Concordia, Kans	0.30	0.14	0.78	0.04	.....	0.18	1.10	0.94	.....	0.16	0.96	.....	1.64	3.68	0.25	0.42	10.59
Topeka, Kans	T.	.....	.....	0.05	.....	0.50	0.04	0.64	0.35	0.22	0.21	0.28	0.24	1.71	0.26	0.91	5.41
Wichita, Kans	0.01	.....	0.98	0.10	.....	2.24	0.04	1.29	T.	.....	0.22	.....	0.22	0.82	0.02	0.26	6.17
Dodge, Kans	0.14	0.10	.....	.....	0.10	0.58	0.06	.....	.....	.....	0.30	0.26	0.28	0.03	0.04	.....	1.89
Denver, Colo	T.	T.	0.01	.....	.....	T.	T.	T.	.....	0.01	T.	.....	0.01	0.03	.....	0.28	0.34
Pueblo, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.06	.....	0.22	T.	.....	.....	0.28
Cheyenne, Wyo	0.10	0.06	0.10	.....	.....	T.	0.01	.....	T.	.....	T.	.....	0.12	T.	.....	.....	0.39
Lander, Wyo	.....	0.62	T.	.....	.....	0.06	0.18	.....	0.48	T.	.....	T.	0.01	0.03	.....	.....	1.38
Oklahoma, Okla	0.58	T.	.01	T.	.....	0.02	1.25	T.	4.06	.....	T.	.....	0.18	3.26	0.02	T.	9.38
Fort Worth, Tex	T.	0.01	.....	.....	.....	T.	.....	T.	T.	.....	T.	.....	0.68	0.46	T.	.....	1.15
Abilene, Tex	T.	0.10	.....	.....	.....	T.	.....	.....	.....	.....	.....	T.	.....	.....	.....	.....	0.10
Amarillo, Tex	T.	.....	.....	.....	T.	0.54	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.54
Palestine, Tex	.....	0.04	.....	T.	.....	.....	.....	.....	.....	.....	.....	0.06	0.05	0.49	0.18	.....	0.82
Taylor, Tex	.....	0.05	.....	0.10	T.	T.	T.	T.	T.	.....	.....	T.	0.02	0.02	0.30	.....	0.49
San Antonio, Tex	.....	0.55	0.01	0.02	T.	T.	0.01	T.	.....	.....	.....	T.	T.	.....	0.01	.....	0.60
Dubuque, Iowa	.....	0.08	T.	T.	0.01	0.06	0.50	0.02	.....	0.10	1.40	1.11	0.02	T.	0.34	0.12	3.76
Davenport, Iowa	.....	.....	T.	T.	.....	0.48	0.08	0.20	0.05	0.08	0.87	0.42	0.38	0.32	2.02	0.46	5.36
Des Moines, Iowa	.....	0.30	T.	0.04	0.02	0.06	1.38	0.12	.....	0.18	2.08	1.38	0.06	0.94	2.52	0.30	9.38
Keokuk, Iowa	.....	T.	0.06	T.	.....	0.76	0.04	0.06	1.40	0.52	.....	0.06	.....	T.	T.	0.38	3.28
Sioux City, Iowa	.....	0.02	0.72	1.08	.....	.....	0.88	0.24	0.02	0.01	0.47	.....	.....	2.27	0.42	0.08	6.21
Kansas City, Mo	.....	0.02	.....	0.06	T.	0.70	0.34	0.74	0.26	0.22	T.	0.76	0.01	0.23	0.68	1.08	5.10
St. Louis, Mo	.....	.....	0.16	0.04	0.40	0.06	.....	.....	T.	0.01	T.	0.12	.....	0.40	T.	0.42	1.61
Springfield, Mo	T.	0.04	0.02	0.70	1.06	0.35	.....	.....	0.06	.....	T.	T.	0.20	0.80	1.54	1.66	6.43
Hannibal, Mo	.....	T.	0.17	0.02	.....	0.49	.....	0.04	1.93	0.06	T.	0.04	.....	0.28	0.32	1.61	3.96
Fort Smith, Ark	T.	0.03	T.	1.36	T.	.....	T.	.....	.....	.....	T.	0.22	0.02	1.96	0.12	0.44	4.15
Little Rock, Ark	T.	T.	T.	0.54	T.	.....	.....	.....	.....	.....	.....	T.	1.14	0.68	0.91	T.	3.27
Shreveport, La	.....	T.	T.	T.	.....	.....	.....	.....	.....	.....	.....	T.	0.02	.....	T.	0.06	0.08

tion of the British Isles during the first decade of the month, and from the 13th to the 16th and 20th to the 24th barometric disturbances were central near the north of Scotland. From the 25th to the 27th the barometer was high over the British Isles.

Storms of marked severity were not reported on the North Atlantic Ocean nor on the Atlantic and Gulf coasts, the Great Lakes, and the north Pacific coast of the United States. On the California coast high northwest winds prevailed during the latter half of the month.

BOSTON FORECAST DISTRICT.

Except the severe drought, which prevailed throughout the month in all sections of the district, the weather of the month was uneventful. One storm warning was ordered on the 27th, which was fully justified along the middle and northern coast, and no storms or high winds occurred for which warnings were not issued.—*J. W. Smith, Forecast Official.*

NEW ORLEANS FORECAST DISTRICT.

The month opened unseasonably cold, with the lowest temperatures on record during the first decade of May in some parts of the district. The forecasts issued for the above conditions on the last day of April were discussed in the report for that month. The frost on the 1st and 2d materially injured cotton in some places. Truck gardens were successfully protected. Storm warnings were issued for parts of the coast on the 10th, 16th, and 28th. Brisk to high winds occurred during the displays. As a whole, the month was unusually mild.

The river continued falling slowly during the month; it was above danger line at New Orleans until the 22d and at Melville, La., at the close of the month. As the water recedes from the overflowed districts, data are being gathered relative to the extent of the overflow and damage resulting therefrom.

Efforts to close the crevasse at Hymelia, 40 miles above New Orleans, proved unsuccessful, and the work has been abandoned. The water is receding very slowly from the overflowed district in the vicinity of this crevasse. Full report on the high water is being prepared as rapidly as possible.—*I. M. Cline, Forecast Official.*

CHICAGO FORECAST DISTRICT.

The Lakes were unusually free from severe storms; the only storm of consequence occurred near the end of the month, for which warnings were sent out well in advance. No casualties of note, due to stress of weather, were reported.—*H. J. Cox, Professor of Meteorology.*

SAN FRANCISCO FORECAST DISTRICT.

The month was, as a whole, exceptionally dry. At San Francisco the month was the driest since 1873, and in general this is true for a large portion of the State. Taken in connection with the dry period during the latter half of April, the result was an unfavorable period for the successful maturing of crops. An interesting question also arises as to whether a progressive easterly movement of this dry period can be traced from the Pacific coast to the Rocky Mountain region and, possibly, to the great central valley. The accompanying table of total air movements shows the extended duration of high winds along the California coast. At Point Reyes Light, Cal., for a period of nine consecutive days, the total air movement recorded was 11,223 miles, or an average hourly movement exceeding 50 miles. (See the special report on a subsequent page.)

The beginning of the month was marked by a distribution of pressure similar to that shown on Chart IV, Sea Level Pressure, MONTHLY WEATHER REVIEW, May, 1902. On May 12, 1903, a depression of moderate depth passed over Washington, Vancouver Island, and British Columbia, and for a brief period the winds on the Pacific coast were from the southeast. There was a quick reversion, however, to the type of pressure distribution first described, and for the balance of the month high northwest winds prevailed with little cessation. The total air movements for the month are as follows:

Wind movement for the month.

Stations.	Total for month.	Average daily.	Greatest in 24 hours.	Greatest hourly movement.
Point Reyes Light, Cal.	24,072	776	1,673	88
Mount Tamalpais, Cal.	16,871	544	1,189	78
San Francisco, Cal.	10,040*	324	517	34
Point Lobos, Cal.	15,431	498	929	60
Southeast Farallon, Cal.	17,331	559	1,185	58

*May, 1899, 10,346 miles.

The wind blew at a velocity equaling or exceeding 60 miles an hour for forty-three hours at Point Reyes Light, Cal., and nineteen hours at Mount Tamalpais.—*A. G. McAdie, Professor of Meteorology.*

PORTLAND, OREG., FORECAST DISTRICT.

May, 1903, in the North Pacific States, was cool and, in many places, unusually dry. Frosts, which, as a rule, were accurately forecast, occurred frequently east of the Cascade Mountains, and in consequence vegetation made slow advancement. No storm warnings were issued and there were no storms during the month.

The cool weather delayed the annual rise in the Columbia River, and at the end of the month the stream, although steadily rising, was well within its banks.—*E. A. Beals, Forecast Official.*

RIVERS AND FLOODS.

The rainfall over the Missouri and upper Mississippi water sheds was largely in excess of the usual amount during the month of May, and, as a natural consequence, high stages of water were experienced in both rivers. In the valley of the Kansas River and its tributaries the precipitation was especially heavy, averaging about seven inches above the normal amount for the month, and much the greater portion occurred during the last two weeks. The results of these unusual conditions were the great floods in the Kansas and lower Missouri, the Des Moines, and the Mississippi rivers from Keokuk to Cairo. These floods were the greatest ever known, with the exception of that of 1844, and were by far the most destructive. The stories of the losses of human lives and of the ruin and desolation at Topeka, Kans., Kansas City, Mo., and its suburbs, and at East St. Louis, Ill., are in a general way familiar to all, and need not be repeated here. The detailed histories of the floods are not yet completed and will be printed at a future time.

The rains were also exceptionally heavy in the valley of the Arkansas River, and stages above the danger lines were general from the Indian Territory to the mouth of the river. Considerable damage was done in the Territory, but none of any consequence to the eastward.

Along the remaining rivers of the country conditions were quiet, with but a single incident or two worthy of special mention. In the navigable rivers the stages were all that could be desired for purposes of transportation by water. Heavy rains on the 14th and 15th over the Southern States caused moderate floods in the rivers of Alabama and lower Georgia. Warnings were issued in due time, and very little damage was done by the waters. All that has been reported was the flooding of some lowland corn along the Alabama River, necessitating replanting.

The annual rise of the Columbia River began on the 16th, and warnings of danger-line stages by the 21st were issued at Portland, Oreg.

The highest and lowest water, mean stage, and monthly range at 159 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, p. m.	48	123	5, a. m.	48	68	3,200	3.5	914	38.1
II	5, a. m.	50	100	9, p. m.	46	60	2,475	4.5	550	22.9
III	10, a. m.	50	100	12, a. m.	48	68	1,550	2.0	775	32.3
IV	10, a. m.	41	124	13, a. m.	48	86	2,675	3.0	892	37.2
Sums							9,900	13.0	3,131	130.5
Mean of 4 paths							2,475		783	32.6
Mean of 13.0 days									762	31.8
Low areas.										
I	4, p. m.	33	112	11, p. m.	27	80	2,450	7.0	350	14.6
II	8, p. m.	33	112	15, p. m.	27	80	2,700	7.0	386	16.1
III	16, a. m.	37	114	21, a. m.	50	64	3,450	5.0	690	28.8
IV	{19, p. m.	37	118{	23, p. m.	50	100	{ 1,625	4.0	406	16.9
	{21, a. m.	52	121{				{ 1,200	2.5	480	20.0
V	25, a. m.	35	112	29, a. m.	50	64	2,950	4.0	738	30.8
VI	27, p. m.	32	107	*1, p. m.	38	90	1,600	5.0	320	13.3
Sums							15,975	34.5	3,370	140.5
Mean of 7 paths							2,282		481	20.1
Mean of 34.5 days									463	19.3

*June.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*George E. Hunt, Chief Clerk, Forecast Division.*

CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Service Divison.

The following summaries relating to the general weather and crop conditions during May are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon voluntary reports from meteorological observers and crop correspondents, of whom there are about 3000 and 14,000, respectively:

Alabama.—The first two weeks were cool and wet; rainfall quite excessive in some eastern and west-central counties; considerable river-land corn drowned. The last two weeks were comparatively warm and dry. Much cotton and corn replanted, owing to damage by cold; at close of the month cotton was small and two to three weeks behind last year; corn also late, but both crops were improving slowly; worms damaged corn considerably, particularly on lowlands.—*F. P. Chaffee.*

Arizona.—During the first half of the month the weather was warm, but the latter half was cold, except for a few days at the end of the month. Heavy and damaging frosts occurred during the latter half of the second and the first half of the third decades in the colder portions of the Territory, but no frosts occurred in the more important agricultural valleys. The precipitation for the month was about normal; irrigation water was generally sufficient for the needs of vegetation, but it was deficient in some localities. Except where damaged by frost, crops did well. Fair to very good crops of grain were harvested in the more important agricultural valleys. The second crop of alfalfa began to be harvested in Maricopa County and the third in the lower Colorado Valley. The fruit crop was very good. Ranges afforded good grazing and cattle were in good condition.—*M. E. Blystone.*

Arkansas.—The first of the month was cool with general rains, which improved crops. Toward the close of the month warmer weather and